[FIG. 2]

A1: MANUAL OPERATION COMMAND SW ACTUATED

A2: NEUTRAL WHEN DEPRESSION STOPPED

A3: RELEASED

A4: AUTOMATIC OPERATION PERMISSION SW ON (PERMITTED)

A5: OFF (NOT PERMITTED)

22: CONTROL UNIT (ECU) INCLUDING A DRIVING CIRCUIT (INCORPORATING A CURRENT SENSOR)

A6: RESPECTIVE SIGNALS

23c: INGNITION SW

23d: WHEEL SPEED SENSOR (FORWARD AND REVERSE ROTATION DETECTION PROVIDED)

23e: GEAR POSITION SENSOR

23f: BRAKE SW

23g: BRAKE FLUID PRESSURE SENSOR

23h: THROTTLE POSITION SENSOR

23i: GRADIENT SENSOR (G SENSOR)

[FIG. 3]

A1: ACTUATION

A2: RELEASE

[FIG. 4]

22: CONTROL UNIT

A1: SIGNAL 1

A2: SIGNAL 2

A3: SIGNAL 3

A4: SIGNAL 4

[FIG. 5]

A1: DEPRESS TO ON SIDE

A2: NEUTRAL

A3: DEPRESS TO OFF SIDE

A4: ELECTRIC SIGNALS

A5: OPERATION SIGNAL

A6: RELEASE SIGNAL

A7: PORTION CORRESPONDING TO RISE OF SIGNAL

[FIG. 6]

A1: MANUAL OPERATION COMMAND SW OPERATION DETERMINEATION ROUTINE

S301: READ SWITCH SIGNALS

S302: SIGNAL 1 ≠ SIGNAL 2?

S303: SIGNAL 3 ≠ SIGNAL 4?

S304: SIGNAL 1=ON?

S305: SIGNAL 3=OFF?

S306: OUTPUT OPERATION SIGNAL

S307: SIGNAL 3=ON?

S308: OUTPUT RELEASE SIGNAL

S309: F/S MODE FOR SW STICKING;

A2: ON_SW FAILURE

A3: OFF_SW FAILURE

A4: ON_SW STICKING or OFF_SW STICKING

[FIG. 7]

S310: IS SIGNAL 1 AT ON-LEVEL?

S311: DETECT SW FAILURE

S312: F/S MODE FOR OPERATION SW FAILURE

S313: DETECT SW POWER SUPPLY FAILURE

S314: F/S MODE FOR OPERATION SW POWER SUPPLY FAILURE

S315: IS SIGNAL 3 AT ON-LEVEL?

S316: DETECT SW FAILURE

S317: F/S MODE FOR RELEASE SW FAILURE

S318: DETECT SW POWER SUPPLY FAILURE

S319: F/S MODE FOR RELEASE SW POWER SUPPLY FAILURE

[FIG. 9]

A1: ELECTRIC PARKING BRAKE SYSTEM MAIN ROUTINE

S2: ENTER SENSOR SIGNALS AND DIAGNOSE FAILURES

S3: FAILURE?

S4: OPERATE F/S

S5: CALCULATE TARGET PULLING FORCE

S6: DETERMINE STOP

S7: IS AUTOMATIC OPERATION PERMISSION SW ON?

S8: AUTOMATIC OPERATION

S9: MANUAL OPERATION

[FIG. 10]

A1: STOP DETERMINATION ROUTINE

S11: ESTIMATED VEHICLE BODY SPEED.2km/h?

S12: RESET STOP DETERMINATION FLAG TO 0

S13: RESET STOP DETERMINATION TIMER

S14: RESET SLOPE JUDGMENT TIMER

S15: IS WHEEL SPEED PULSE OUTPUTTED?

S16: COUNT UP STOP DETERMINATION TIMER

S17: STOP DETERMINATION TIMER ≧[200msec]?

S18: SET STOP DETERMINATION FLAG TO 1

S19: IS BRAKE PEDAL ON?

S20: BRAKE FLUID PRESSURE≧[1MPa]?

S21: RESET EMERGENCY OPERATION F TO 0

S22: RESET ABS FLAG TO 0

S23: RESET LO-μ FLAG TO 0

[FIG. 11]

A1: AUTOMATIC OPERATION ROUTINE

S31: STOP DETERMINATION FLAG-1?

S32: IS GEAR POSITION SIGNAL P or N?

S33: AUTOMATIC ACTUATION

S34: EMERGENCY OPERATION FLAG=1?

S35: AUTOMATIC RELEASE

S36: IS ACCELERATOR PEDAL OFF?

S37: CONTINUE-OPERATION FLAG=1?

S38: CONTINUE-RELEASE FLAG=1?

S39: IS BRAKE PEDAL ON?

A2: AUTOMATIC RELEASE 1

[FIG. 12]

A1: AUTOMATIC RELEASE 1

S40: IS GEAR POSITION SIGNAL R?

S41: GRADIET<[-5%]?

S42: RESET SLOPE JUDGMENT TIMER

S43: CONTINUE-RELEASE FLAG=1?

S44: IS PREVIOUS GEAR POSITION SIGNAL OTHER THAN R?

S46: GRADIENT>[5%]?

S47: RESET SLOPE JUDGMENT TIMER

S48: CONTINUE-RELEASE FLAG=1?

S49: IS PREVIOUS GEAR POSITION SIGNAL OTHER THAN D?

S50: AUTOMATIC RELEASE

S51: COUNT UP SLOPE JUDGMENT TIMER

S52: SLOPE JUDGMENT TIMER≧[200msec]?

S53: AUTOMATIC ACTUATION

[FIG. 13]

S54: EMERGENCY OPERATION FLAG=1?

S55: IS GEAR POSITION SIGNAL D?

S56: THROTTLE OPENING>THD?

S57: GRADIENT<[-15%]?

S58: AUTOMATIC RELEASE

S59: AUTOMATIC RELEASE

S60: IS GEAR POSITION SIGNAL R?

S61: THROTTLE OPENING>THR?

S62: GRADIENT>[10%]?

S63: AUTOMATIC RELEASE 2

[FIG. 14]

S64: STOP DETERMINATIN FLAG=1?

S66: IS WHEEL SPEED PULSE OUTPUTTED?

S67: IS WHEEL SPEED PULSE ROTATING FORWARD?

S68: ADD ACCUMULATED TRAVELING MILEAGE

S69: SUBTRACT ACCUMULATED TRAVELING MILEAGE

S70: IS GEAR POSITION D?

S71: ACCUMULATED TRAVELING MILEAGE<[-10cm]?

S72: IS GEAR POSITION SIGNAL R?

S73: ACCUMULATED TRAVELING MILEAGE>[10cm]?

S74: ACCUMULATED TREVELING MILEAGE ABSOLUTE VALUE>[10cm]?

S75: AUTOMATIC PULLING FORCE INCREASE

[FIG. 15]

A1: AUTOMATIC OPERATION ROUTINE

S81: RESET AUTOMATIC RELEASE PROHIBITION FLAG TO 0

S82: RESET CONTINUE-RELEASE FLAG TO 0

S83: AUTOMATIC OPERATION PROHIBITION FLAG=0?

A2: 1= OPERATION PROHIBITED

A3: =0: OPERATION PERMITTED

S84: OPERATION MODE FLAG=0?

A4: =1 OR LARGER: OPERATED

A5: =0: OPERATION NOT PERMITTED

S85: ABNORMALITY DETECTION FLAG=0?

A6: =1: ABNORNAL SENSOR

A7: =0: NORMAL

S86: SET TARGET PULLING FORCE (BfT) TO BfT1

S87: SET TARGET PULLING FORCE (BfT) TO BfT3; AUTOMATIC PULLING FORCE INCREASE 1

[FIG. 16]

A1: AUTOMATIC PULLING FORCE INCREASE 1

S88: SET TARGET CURRENT (TA) TO BfT × CONVERSION COEFFICIENT (a)

S89: ON MOTOR FORWARD ROTATION (DUTY 100%)

S90: IS THERE PREVIOUS OPERATION?

S91: RESET ACTUATION TIMER TO 0

S92: COUNT UP ACTUATION TIMER

S93: ACTUATON TIMER>[100msec]?

S94: CURRENT VALUE (n)≧TARGET CURRENT (TA)?

S95: OPERATION MODE FLAG UP+1?

S96: ILLUMINATE OPERATION INDICATOR LAMP

S97: OFF MOTOR FORWARD ROTATION

S98: RESET CONTINUE-OPERATION FLAG TO 0

S99: ACTUATION TIMER≧[3.0sec]?

S100: SET CONTINUE-OPERATION FLAG TO 1

S101: EXECUTE F/S PROCESS DURING OPERATION

[FIG. 17]

A1: AUTOMATIC RELEASE ROUTINE

S111: RESET AUTOMATIC OPERATION PROHIBITION FLAG TO 0

S112: RESET CONTINUE-OPERATION FLAG TO 0

S113: AUTOMATIC RELEASE PROHIBITION FLAG=0?

A2: =1: RELEASE PROHIBITED

A3: =0: RELEASE PERMITTED

S114: IS THERE PREVIOUS RELEASE OPERATION?

S115: RESET RELEASE TIMER TO 0

S116: STROKE ≦0 POSITION + [2mm]?

S122: RESET OPERATION MODE FLAG TO 0

S117: ON MOTOR REVERSE ROTATION (DUTY 100%)

S118: COUNT UP RELEASE TIMER

S119: RELEASE TIMER≧[3.0sec]?

S120: SET CONTINE-RELEASE FLAG TO 1

S121: EXECUTE F/S DURING RELEASE

S122: RESET OPERATION MODE FLAG TO 0

S123: TURN OFF OPERATION INDICATOR LAMP

S124: OFF MOTOR REVERSE ROTATION

S125: RESET CONTINUE-RELEASE FLAG TO 0

[FIG. 18]

A1: AUTOMATIC RELEASE 2 ROUTINE

S131: RESET AUTOMATIC OPERATION PROHIBITION FLAG TO 0

S132: RESET CONTINUE-OPERATION FLAG TO 0

S133: AUTOMATIC RELEASE PROHIBITION FLAG=0?

A2: =1: RELEASE PROHIBITED

A3: =0: RELEASE PERMITTED

S134: IS THERE PREVIOUS RELEASE 2 OPERATION?

S135: RESET RELEASE TIMER TO 0

S136: STROKE ≦0 POSITION + [2mm]?

S141: RESET OPERATION MODE FLAG TO 0

S137: ON MOTOR REVERSE ROTATION (DUTY 50%)

S138: COUNT UP RELEASE TIMER

S139: RELEASE TIMER≧[2.0sec]?

S140: AUTOMATIC RELEASE

[FIG. 19]

A1: AUTOMATIC PULLING FORCE INCREASE ROUTINE

S151: RESET AUTOMATIC RELEASE PROHIBITION TO 0

S152: RESET CONTINUE-RELEASE FLAG TO 0

S153: AUTOMATIC OPERATION PROHIBITION FLAG=0?

A2: =1: OPERATION PROHIBITED

A3: =0: OPERATION PERMITTED

S154: ABNORMALITY DETECTION FLAG=0?

A4: =1: AMBORNAL SENSOR

A5: =0: NORMAL

S155: SET TARGET PULLING FORCE (BfT) TO BfT1

S156: SET TARGET PULLING FORCE (BfT) TO BfT1; AUTOMATIC PULLING

A6: FORCE INCREASE 2

[FIG. 20]

A1: AUTOMATIC PULLING FORCE INCREASE 2

S157: SET TARGET CURRENT (TA) TO BfT × CONVERSION COEFFICIENT (a)

S158: ON MOTOR FORWARD ROTATION (DUTY 100%)

S159: IS THERE PREVIOUS AUTOMATIC PULLING FORCE INCREASE OPERATION?

S160: RESET ACTUATION TIMER TO 0

S161: COUNT UP ACTUATION TIMER

S162: ACTUATON TIMER>[100msec]?

S163: CURRENT VALUE (n)≧TARGET CURRENT (TA)?

S164: OPERATION MODE FLAG UP+1?

S165: ILLUMINATE OPERATION INDICATOR LAMP

S166: OFF MOTOR FORWARD ROTATION

S167: RESET ACCUMULATED TRAVELING MILEAGE TO 0

S168: ACTUATION TIMER≧[3.0sec]?

S169: EXECUTE F/S PROCESS DURING OPERATION

[FIG. 21]

A1: MANUAL OPERATION ROUTINE

S171: IS OPERATION SW CHANGED TO LO TO HI?

S172: RESET RELEASE COMMAND FLAG TO 0

S173: COMMAND LEVEL FLAG up+1

S174; RESET ABS, LO-μ FLAG TO 0

S175: IS RELEASE SW ON?

S176: RESET COMMAND LEVEL FLAG TO 0

S177: RESET EMERGENCY OPERATION FLAG TO 0

S178: SET RELEASE COMMAND FLAG TO 1

[FIG. 22]

S179: RELEASE COMMAND FLAG=1?

S180: CALCULATE EACH PARAMETER

S181: COMMAND LEVEL FLAG≧1?

S183: RESET TARGET DECELERATION 0.0G

S184: MANUAL OPERATION

S185: RESET TARGET DECELERATION TO 0.0G

S186: MANUAL RELEASE

S187: LO-μ FLAG=0?

S188: IS OPERATION SWITCH LEVEL HIGH?

S189: GRF≦TARGET DECELERATION?

S190: UPDATE TARGET DECELERATION TO GRF

S191: CALCULATE TARGET DECELERATION BY COMMAND LEVEL × -0.15G

S192: SET EMERGENCY OPERATION FLAG TO 1

[FIG. 23]

S194: SET LO-μ FLAG TO 1

S196: CALCULATE TARGET DECELERATION BY GRF × 90%G

S197: SET ABS FLAG TO 1

S198: RESET CONTINUATION TIMER TO 0

S199: STROKE≦0 POSITION + [2mm]?

S200: ON MOTOR REVERSE ROTATION

S201: VEHICLE BODY SPEED<[-0.4G]?

S202: VEHICLE BODY SPEED<TARGET DECELERATION?

S203: RESET CONTINUATION TIMER TO 0

S205: COUNT UP CONTINUATION TIMER

S206: CONTINUATION TIMER>[500msec]?

S207: RESET ABS FLAG TO 0

S208: ABS FLAG=1?

S209: SET MOTOR DUTY TO LESS THAN 100%

S210: SET MOTOR DUTY TO 100%

S211: ON MOTOR FORWARD ROTATION

[FIG. 24]

A1: MANUAL OPERATION ROUTINE

S221: IS AUTOMATIC RELEASE DETERMINED?

S222: SET AUTOMATIC RELEASE PROHIBITION FLAG TO 1

S223: RESET AUTOAMTIC OPERATION PROHIBITION FLAG AND CONTINUE-OPERATION/RELEASE FLAG TO 0

S224: STOP DETERMINATION =1?

S225: ABNORMALITY DETECTION FLAG=0?

A2: =1: ABNORMAL SENSOR

A3: =0: NORMAL

S226: SET TARGET PULLING FORCE (BfT) TO BfT1

S227: SET TARGET PULLING FORCE (BfT) TO BfT2

S228: SET TARGET PULLING FORCE (BfT) TO BfT3

A4: AUTOMATIC PULLING FORCE INCREASE 3

[FIG. 25]

A1: AUTOMATIC PULLING FORCE INCREASE 3

S229: SET TARGET CURRENT (TA) TO BfT × CONVERSION COEFFICIENT (a)

S230: ON MOTOR FORWARD ROTATION (DUTY 100%)

S231: IS THERE PREVIOUS OPERATION?; S232: RESET ACTUATION TIMER TO 0

S233: COUNT UP ACTUATION TIMER

S234: ACTUATON TIMER>[100msec]?

S235: CURRENT VALUE (n)≧TARGET CURRENT (TA)?

S236: OPERATION MODE FLAG UP+1?

S237: ILLUMINATE OPERATION INDICATOR LAMP

S238: OFF MOTOR FORWARD ROTATION

S239: RESET COMMAND LEVEL FLAG TO 0

S240: ACTUATION TIMER≧[3.0sec]?

S241: EXECUTE F/S PROCESS DURING OPERATION

[FIG. 26]

A1: MANUAL RELEASE ROUTINE

S251: IS AUTOMATIC OPERATION DETERMINED?

S252: SET AUTOMATIC OPERATION PROHIBITION FLAG TO 1

S253: RESET AUTOAMTIC OPERATION PROHIBITION FLAG AND CONTINUE-OPERATION/RELEASE FLAG TO 0

S254: IS THERE PREVIOUS RELEASE OPERATION?

S255: RESET RELEASE TIMER

S256: STROKE≦0 POSITION + [2mm]?

S261: RESET OPERATION MODE FLAG TO 0

S262: TURN OFF OPERATION INDICATOR LAMP

S263: OFF MOTOR REVERSE ROTATION

S264: RESET RELEASE COMMAND FLAG TO 0

S257: ON MOTOR REVERSE ROTATION (DUTY 100%)

S258: COUNT UP RELEASE TIMER

S259: RELEASE TIMER≧[3.0sec]?

S260: EXECUTE F/S PROCESS DURING RELEASE

[FIG. 27]

A1: PULLING FORCE

A2: UPPER LIMIT

A3: PULLING FORCE REQUIRED WHEN LOADED AS REGULATED

A4: PULLING FORCE REQUIRED WHEN LOADED LIGHTLY

A5: GRADIENT

[FIG. 28]

A1: GRADIENT

A2: THROTTLE OPENING THRESHOLD THD

[FIG. 29]

A1: OPERATIN SW

A2: RELEASE SW

A3: WHEEL SPEED Vw

A4: CURRENT

A5: STROKE

A6: VEHICLE BODY DECELERATION GRF

A7: 0 POSITION

A8: TARGET DECELERATION Gt

A9: TIME

[FIG. 30]

A1: OPERATION SW

A2: WHEEL SPEED Vw

A3: CURRENT

A4: STROKE

A5: VEHICLE BODY DECELERATION GRF

A6: TARGET DECELERATION Gt

A7: 0 POSITION

A8: TIME

[FIG. 31]

A1: OPERATION SW

A2: WHEEL SPEED Vw

A3: SLIP AMOUNT REGULATING VALUE

A4: REAR WHEEL ACCELERATION AND DECELERATION RrG

A5: CURRENT

A6: VEHICLE BODY DECELERATION GRF

A7: FRONT WHEEL ESTIMATED VEHICLE BODY SPEED VRF

A8: TARGET DECELERATION Gt

A9: TIME